the principal segment of the polyp-cell. Lastly, the ventral septula have still shorter and thick filaments, and the septula are continued as far as the extremity of the ventral diverticula of the body-cavity.

11. The *sexual organs* are seated only on the four lateral septula, occur only in fully developed polyps, and in other respects are as in the other Pennatulidæ.

12. The *rudimentary polyps* or *zooids* are seated upon the dorsal surface of the disk, in groups of from five to thirty or forty together. Each group possesses in its interior a common cavity, and on the surface as many small cavities as there are zooids; and in each of these there are eight very small septa without mesenteric filaments. The common cavity of each group opens by a round aperture into the main cell of a polyp or into its dorsal diverticulum.

13. Around the groups of zooids a variable number of spines are often seated. It is a matter of more interest that in certain species one zooid regularly possesses simple tentacles on two compartments, which serve to represent the lateral ventrals; these represent the calycine tentacles of the sexually mature polypes, and are generally supported by two spines. The zooid bearing these two tentacles is also usually larger than the rest.

14. The aquiferous pore described by Fritz Müller in the middle of the frond of the *Renillæ* is the orifice of an isolated large zooid possessing a stomach and eight septa, but no plumose tentacles, filaments, or sexual organs, and somewhat resembling, in size and the spines surrounding it, the sexually mature animal. The body-cavity of this "chief zooid" opens into the end of the dorsal sinus of the keel.

15. The polyp-cells are lined with epithelium, muscles, and connective tissue; and these muscles produce the extraordinarily strong extensions and contractions of which the frond of *Renilla* is capable.

16. The *spicules* of the *Renillæ* are all essentially of the same form (see my 'Icones histiol.'), and, after the extraction of the calcareous salt by acids, leave a coloured organic residue of exactly the form of the previous structure.—*Proc. of the Phys.-med. Gesellschaft in Würzburg*, Feb. 4, 1871.

Observations on Urnatella, *a Genus of Ciliated Polyps of the Family* Pedicellinidæ. By Prof. Leidy.

This polyp is found abundantly below the dam at Fairmount, in the Schuylkill River, adhering to stones and rocks, on the sides and underpart not in contact with the ground. Occasionally it is observed attached to the shell of the living *Unio complanatus* and *Melania virginica*, and less frequently to the stem of *Schollera graminea* and the leaves of *Vallisneria spiralis*. In the locality named, on the rocks, there may be observed, in association with *Urnatella*, the following animals:—*Spongilla fragilis*, *Limnias ceratophylli* (usually abundant and in compound bunches), *Cothurnia pusilla* (parasitic on *Urnatella* and *Limnias*), *Hydra carnea*, Ag., *Paludicella*

elongata, *Plumatella vesicularis*, and the worm *Manayunkia speciosa*, &c.

Unlike the marine genera of Pedicellinidæ, the polyp-stocks of *Urnatella* are erect or semierect, and not prostrate or creeping attached along the surface of bodies. *Urnatella* starts by a thin membranous disk or expansion tightly adherent to the point of support. Usually two stems or stocks (occasionally three or only one) start from the same disk, and diverge from each other in a gentle curve. The stems may be seen from a simple pedicle without division to a series of eleven divisions or segments, exclusive of the polyp-head. A colony of *Urnatella* recalls to mind a miniature patch of plants in a flower-garden. The smallest polyps are translucent whitish or nearly colourless; the largest are less than two lines long, and alternately white and blackish or brownish. When disturbed, the polyps retract their arms, hang their heads, and bend downward, so that the heads touch the basis of support, or the stems even become somewhat involute. Voluntarily the polyps are often observed abruptly to move from one side to the other in the most singular manner, as if wearied of remaining too long in the same position. In these movements the stems bend the entire length, but there is no contraction or shortening. In attempting to detach a polyp, the heads suddenly bend downward in such a manner as if the violence elicited a feeling of pain in the animal.

The terminal two or three segments of the parent stems usually give off a branch on each side; and this branch sometimes gives off a second. The branches always consist of a pedicel or single joint supporting a polyp-head.

In a polyp-stock of more than two divisions, independent of the polyp-head, the additional segments are urn-shaped. The penultimate segment is barrel-shaped; the last one cylindrical or elavate.

The polyp-heads are provided with from a dozen to sixteen ciliated arms. The internal structure of the polyps, including that of the stems, bears a resemblance to that of *Pedicellina*, and will be more particularly described in a memoir preparing on the animal.

The youngest independent polyp-stems of *Urnatella* consist of a simple cylindrical pedicel starting from the disk of attachment to the rock, and supporting a single polyp-head. The pedicel elongates and divides into two segments. The ultimate segment grows in length, and again divides; and in this manner all the segments are produced. After the production of three segments, the antepenultimate segment assumes the urn-form. Budding commences from the second and third segments after their production, and from the succeeding segments, but not usually from the first segment. The buds originate from opposite sides of the base of the segments, and form branches of a single segment with a polyp-head. The pedicel of these branches also frequently gives off a bud, which forms a secondary branch of the same kind as the primary ones.

In the longer *Urnatella*-stocks branches are usually observed only from the one, two, or three terminal segments. In the posterior urn-shaped segments, in the position in which branches emanate in the terminal segments, cup-shaped processes are observed. These

were formerly mistaken for buds, but evidently result from the dehiscence or separation of branches which leave the parent stock to establish colonies elsewhere. Though I have not observed this separation take place in *Urnatella*, yet all the points of structure appear to indicate that it actually takes place in the manner intimated.

It thus appears that the first step towards the multiplication of *Urnatella* is the segmentation of its stem. The segments put forth buds which develope polyps, and these then separate from the parent stock to settle elsewhere and become the source of other series of polyps.

The ultimate history of the segmented polyp-stock of *Urnatella* I have not ascertained. The stocks which I have preserved in an aquarium for several months finally lose their terminal polyps. Late in the season, also, all the polyp-stocks which I could obtain on the river-shore within the reach of my arm, at low tide, were deprived of their terminal polyps. The destruction of these, however, I have suspected to have been due to their having been uncovered in lower tides earlier in the season. I hope yet to be able to determine this question in the course of the next few weeks.

It has occurred to me that the segmented stems of *Urnatella*, after the decay of the polyps, remained through the winter with little obvious change, and that in the following season the segments served as reproductive bodies, in the same manner as the statoblasts in Plumatellidæ and their allies. This view, however, is not confirmed by specimens retained in the aquarium and those collected on the edge of the river which had lost their polyps.

In relation to the production of ova, or the reproduction of *Urnatella* through sexual agency, I have yet learned nothing.

Among the animals mentioned as found in association with *Urnatella* is the singular Annelide *Manayunkia speciosa*, discovered by me some years ago (Proc. Acad. Nat. Sc. 1858, p. 90). The worm is closely allied to the marine genus *Fabricia*, and, like it, lives in tubes constructed of mud. It is abundant in the locality indicated. Individuals about two lines in length are usually seen in a state of division near the middle into two. The anterior division of the body consists of five bristle-bearing annuli in addition to the head. The posterior division consists of six bristle-bearing annuli in addition to the partially developed head. The anterior head is provided with about thirty-six ciliated tentacula supported on four lobes. It is also furnished with a pair of eyes; besides which the tentacle-bearing lobes exhibit a number of pigmentary spots, apparently of the nature of eyes. No eyes exist in the tail of *Manayunkia* as they do in *Fabricia*. The blood is green, and is pumped intermittently into a large vessel occupying one tentacle on each side of the middle of the head.

I have studied the development of *Manayunkia*, which will be fully described in a future memoir on the animal. Curiously enough, the development of the young takes place within the tube of the parent, and the young remain in this position for a considerable time after their development. Thus I have obtained the young

from the tube of the parent after it was one third of a line in length, and consisted of ten annuli, including the head, from which projected ten tentacles.—*Proc. Acad. Nat. Sc. Philad.* Sept. 20, 1870.

Note on transversely striated Muscular Fibre among the Gasteropoda. By W. H. Dall.

In studying the radula of a species of *Acmæa* (probably *A. borneensis*, Rve.) obtained by Prof. A. S. Bickmore at Amboyna, I noticed, on placing the structure under a power of 100 diameters, that certain of the muscular fibres which adhered to it, when torn from the buccal mass, had a different appearance from the others. On increasing the power to some 800 diameters, it was at once evident that the different aspect of these fasciculi was caused by fine, but clearly defined, transverse striation. Suspecting that it was an optical delusion, caused by a very regular arrangement of the nuclei of the fibres, I subjected the muscle to various tests and to still higher magnifying-powers. I also introduced under the same glass some of the voluntary dorsal muscles of a small crustacean, for comparison. The structure of the ultimate fibres in both appeared to be similar. These seemed to be composed of a homogeneous tube or cylindrical band of translucent matter, with nuclei interspersed at irregular intervals. In neither was there any appearance of separation into transverse disks, as is seen in the striated muscles of vertebrates. That the striated appearance was not due to contraction and folding of the muscle was evident upon taking a side view of one of the fibres, when the striæ on each side, as well as the intervening elevations, were seen to correspond exactly to each other.

The only perceptible differences between the muscles of the crustacean and the striated muscles of the mollusk appeared to be that the latter were much more finely striate, the striæ being six to eight times as numerous as in the former, in the same space. No difference between the striated and non-striated muscles of the *Acmæa* could be observed, except in the fact of the striation. In both the nuclei were irregularly distributed. The appearance of the striated fibre reminded one of a string of rhombic beads, which bore no relation to the position of the true nuclei. The striated fibres appeared, after a careful dissection of the parts in a number of specimens, to be the retractors of the radula; they were longer and in narrower bands than the non-striated fibres, and comparatively much fewer in number. The striation was most evident toward the middle of the fibres, and became evanescent toward their extremities.

Lebert and Robin (Müller's Arch. f. Anat. und Phys. 1846, p. 126) state that the primitive muscular fasciculi of invertebrates often have the nuclei and intervening clear spaces "arranged in such regular order that they might, at the first glance, be mistaken for transversely striated muscular fibres. The latter, however, are actually found in one acephalous mollusk, *Pecten* (and probably in *Lima* also), and some annelids," and are constantly present in the